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SOURCE Przeglad Gorniczy, Vol V (XXXVI), No 1 (612), 1949.POLISH LONG-TERM STORAGE OF CANNEL DUFF

Jan Hurysz, Mining Engr

(Polish editor's note: With the activation of new electric power plants and other industrial installations, it is anticipated that duff consumption will be notably increased; therefore, the necessity of efficient storage of the present surplus of duff comes to the fore. This article presents considerations on the basis of which a directive will be worked out covering long-term storage of cannel duff.)

Articles appearing in publications of the INBPW (Instytut Naukowo-Badawcze Przemyslu Weglowego, Scientific Research Institutes of the Coal Industry) and in the Przeglad Gorniczy (Mining Review) have highlighted problems related to duff and have created a basis for its evaluation as a valuable fuel.

The disparity between the increasing production of duff and the stabilized demand of the domestic market will disappear after 3-4 years, when large new electric power plants and cement works will be activated, and when the existing industrial plants will be equipped with furnaces to burn duff. Then duff will take its place with commercial varieties.

It is known from experience that a surplus of cannel duff heaped in coal mine dumps often begins to burn after a lapse of several weeks. One of the main causes of this is acceleration of the oxidation of coal, accompanied by a number of secondary chemical reactions in the presence of oxygen. Sealing off air will reduce the tendency to spontaneous combustion in duff piles. The large dispersion in the grain size of duff, ranging from 0 to 10 millimeters, permits easy access of air. It is recommended that plants equipped with dust exhausts and with installations for sorting duff with a narrower size range than 0 to 10 millimeters should fully utilize such equipment. Plants which do not have such equipment should make an effort to have it installed so that the grain size of duff will vary from 1 to 3 millimeters, or at most, 1 to 6,

- 1 -

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while dust exhausts separate a size ranging from 0 to 1 millimeters. If two or more grades of duff are produced, each should be stored in a separate dump. Washed or blown duff should not be dumped with run-of-the-mine duff.

At present, duff dumps are located at all collieries, and stores at individual collieries vary from several hundred tons to 80,000 tons. Duff of high caloric value sometimes is stored in dumps, while poorer grades, more resistant to spontaneous combustion, are sold. Collieries cannot ascertain whether a lack of demand for duff is temporary or permanent and cannot determine how much space will be required. As a result, duff dumps are not arranged properly at most of the collieries. Insufficient space is allotted, resulting in dumps exceeding a height of 10 meters, sometimes in the proximity of burning culm dumps. Another shortcoming is the uneven and loose foundation of the dump.

It is recommended that planning be introduced in the distribution of orders for duff and in the storage of duff surplus. For this purpose, sources of cannel duff will be classified according to two groups as follows:

Group I will comprise the majority of collieries producing duff with higher caloric value, fewer impurities, and greater tendency to spontaneous combustion. These collieries will receive a steady stream of orders to avoid long-term storage of duff.

Group II will include several collieries producing lower grade duff with a smaller tendency to spontaneous combustion. After an allowance for the mine's own requirements for duff, the entire surplus will be consigned to long-term storage.

The classification of collieries and the distribution of orders for duff will be determined by competent authorities.

It is recommended that dumps be classified as either operating or long-term dumps. Operating dumps will serve to balance the current supply of duff against fluctuating consumption and sale of duff. The size of these dumps should not exceed the maximum range of fluctuations in demand. The arrangement of these dumps should comply with the regulations in the brochure entitled, Principles and Pointers for Storing Black Coal, Coke, and Briquettes in Storage Dumps, issued by the CZPPW (Centrala Zbytu Produktow Przemyslu Weglowego, Central Sales Office for Coal Products). As a rule, only collieries included in Group I will have operating dumps.

Long-term dumps will be located exclusively at collieries in Group II. These dumps will contain duff to be stored for the next 3 years and therefore should not be disturbed for current requirements.

The advantage in creating separate long-term duff dumps is that the processing, operation, and inspection connected with long-term storage will be concentrated at only a few collieries; the majority of the collieries will not have to devote any attention to this problem. Through concentration, dumps can be efficiently arranged and costs of transportation and storage reduced.

In working out the various methods of storing cannel duff, it is necessary to consider dumps on level ground, dumps in earth hollows, dumps for several collieries jointly, and dumps at points of utilization.

#### Dumps on Level Ground

For long-term dumps to be used either by one or several collieries jointly, a location convenient for transportation should be selected. The area for dumps

- 2 -

RESTRICTED

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should be level; any unevenness should be leveled and the foundation of the dump should be tamped. It is recommended that foundations for dumps be paved with stones or concrete, using broken sandstone.

The minimum area allotted to such dumps, for one or several collieries, should be large enough to store the quantity of duff expected for a given period, with the height of the dump not surpassing 4 meters. In the future, this height may be increased as more practical experience is gained.

Dumps comprising duff of uniform grade should take the form of standard rectangular prisms, with a base of 60 x 150 meters. The longer side of the prism should run parallel to the prevailing winds.

A study is recommended of the possibility of using the water-pipe system of conveying duff to dumps, on the order of hydraulic stowing of sand in mines. It has the advantage of cheap installation, cheap operation, and automatic plugging of air gaps with small particles deposited by the water.

If the hydraulic method of conveying duff is not used, the dump should be tamped or rolled periodically -- for example, for each  $\frac{1}{2}$  meter of duff added.

An inexpensive method of loading duff directly into railroad cars -- for example, the use of scrapers -- should be considered when dump locations are selected.

The temperature of the dumps should be checked at regular intervals of time. A continuous record should be maintained as follows:

Duff Record

<u>Dump (Prism)</u> <u>No</u>	<u>Date</u>	<u>Quantity</u> <u>Added to</u> <u>Dump</u> <u>(tons)</u>	<u>Status of</u> <u>Dump</u> <u>(tons)</u>	<u>Temp</u> <u>Readings</u> <u>(C)</u>	<u>Remarks</u>
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Dumps in Hollows

It is recommended that hollows, such as dried-up ponds and old sand pits, be used for long-term duff dumps if they are located near the collieries. Care, however, should be taken to see that such hollows do not have openings leading to old mines. As a rule, hollows of large capacity should be selected.

If possible, brinks of the hollow should be evened and the bottom leveled, tamped, or paved. The sides should be graded to approximately 45 degrees, the area should be equipped with conveyers, and a water-pipe system for possible flooding should be installed, unless the hydraulic method of transport is used.

It should be remembered that in the future, the collection of duff will be done mechanically by dredgers or scrapers directly into railroad cars.

Dumps in hollows will be protected from the wind. If drainage is poor, the surface may be covered with water.

Disadvantages of this type of dump are the difficulties of transportation and handling.

- 3 -

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Common Dumps for Several Collieries

The possibility of a common dump for several collieries, if the terrain and distribution of collieries are favorable, should be considered. This facilitates inspection and handling.

Dumps at Points of Utilization

The idea of creating long-term duff dumps near plants which will use large amounts of duff in the future should be considered. Such dumps should comply with the conditions described above.

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- 4 -

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